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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
RAHIM, AZIM	

ART UNIT	PAPER NUMBER
3744	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/799,652	LEE ET AL.	
	Examiner	Art Unit	
	AZIM RAHIM	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,10-16,18 and 21-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,10-16,18 and 21-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1, 3-7, 12-16, 18, 21-24 and 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hisai et al. (US 2003/0192686) in view of Hara et al. (US 5,413,167) and Emoto (US 7,064,804).

Regarding claim 1, Hisai et al. discloses a baking system (fig. 3) having a holding unit (11) adopting a heat pipe structure (see paragraph 54, lines 1-6) including a plate for receiving a wafer to be baked (holding table mounting face 11a, see paragraph 54, lines 7-13), a heater for heating the plate (heater 17 heating a working fluid to expand throughout holding table 11, [0056]), and a cooling apparatus for cooling the plate [see paragraph 57]. Hisai et al. further

disclose a thermostatic element (the combination of pipes 21 and 22, valve 26 and refrigerant supply source 25) adapted to maintain an approximately constant temperature of the coolant supplied into the heat pipe when the plate is cooled [the thermostatic element as taught by Hisai et al. has appropriate structure to perform this intended use function].

Hisai et al. fail to disclose a heat pipe for cooling the plate using vaporization of a coolant therein, the heat pipe arranged in proximity to the plate with the heater disposed therebetween; a coolant storage tank for supplying the coolant to the cooling element when the plate is cooled and for storing the coolant when the plate is heated. Hisai et al. also fail to disclose that the heat pipe is disposed external to the plate, the heat pipe and the plate being discrete elements and the heater being disposed between the heat pipe and the plate.

Hara et al. disclose a system including a plate (wafer chuck 91) for receiving a wafer (column 9, lines 15-20), and a cooling apparatus for cooling the plate, the cooling apparatus comprising: a heat pipe (interior of wafer chuck 91) for cooling the plate using vaporization of coolant therein (column 9, lines 41-63), the heat pipe arranged integrally with the plate (illustrated in figure 9); a coolant storage tank (97) for supplying coolant into the heat pipe when the plate is cooled (column 9, lines 19-21) via a coolant supply pipe; and a thermostatic element (heat exchanger 2) for maintaining an approximately constant temperature of the coolant supplied to the heat pipe when the plate is cooled (see column 5, lines 34-41).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of Hisai et al. to include the heat pipe and coolant storage tank for cooling the plate and the thermostatic element as taught by Hara et al. in

order to maintain the wafer at a constant temperature, thus preventing deformation in the circuitry of the wafer.

Emoto teaches a temperature adjustment apparatus [see figure 4] that includes a wafer (1) disposed on a plate (3), a heating unit (30) disposed between the plate and cooling fluid container (7).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the baking system of Hisai et al. as modified by Hara et al. to include the plate as taught by Emoto in order to prevent the corrosion of the existing plate of Hisai et al., thus preventing malfunction of the system.

Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the baking system of Hisai et al. as modified by Hara et al. to include the heater being positioned between the plate and the heat pipe as taught by Emoto in order to provide quicker response to heating the wafer, thus increasing the efficiency of the system.

Regarding claim 26, the limitations "configured to provide flow communication between the coolant storage tank and the heatpipe," "configured to receive the coolant from the heat pipe via the coolant supply line" and "configured to receive the coolant from the coolant storage tank via the coolant supply line" are statements of intended use, and indicates that the claimed apparatus has to be designed to perform the function intended to be performed, not the action of positively performing the function, as is the case here.

Regarding claims 3 and 4, Hisai et al. teach the limitation of providing a cooling water tank (25) for circulating cooling water through the heat pipe [see paragraph 58]; and a cooling water supply line (22), which is a path of cooling water, that extends into the heat pipe and provides flow communication between the heat pipe and the cooling water storage tank [illustrated in figure 3 and see paragraph 58], and providing a valve (26) between the cooling water storage tank and the heat pipe [illustrated in figure 3].

Regarding claim 5, Hisai et al. as modified by Hara et al. teach all the limitations of the claimed invention, but Hisai et al. fail to teach the limitation of providing a coolant supply pipeline for providing flow communication between the coolant storage tank and the heat pipe.

Hara et al. disclose the limitation of providing a coolant supply pipeline (96) for providing flow communication between the coolant storage tank and the heat pipe (illustrated in figure 9; see column 9, lines 21-24).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the baking system of Hisai et al. to include the coolant supply pipeline as taught by Hara et al. in order to prevent the wick inside the heat pipe from drying out, thus increasing cooling efficiency.

Regarding claim 6, Hara et al. disclose the limitation of providing a valve (98) between the coolant storage tank and the heat pipe (illustrated in figure 9).

Regarding claim 7 Hara et al. disclose the limitation of the heat pipe having a ceiling portion and internal side portions (illustrated in figure 4 that the interior of wafer chuck 31, which corresponds to wafer chuck 91, has interior sides).

Regarding claims 12 and 24, Hara et al. disclose the limitation of providing a wick (38) on the ceiling portion and on the internal side portions of the heat pipe (illustrated in figure 4).

Regarding claim 13, Hisai et al. as modified by Hara et al. teach the limitation of the wick on the ceiling portion and the wick on the internal side portions of the heat pipe has a linear shape [as illustrated in figure 4, wick 38 is linear in shape], a spiral shape or a radial shape.

Regarding claim 14, Hisai et al. as modified by Hara et al. teach all the limitations of the claimed invention, but fail to teach the limitation of the wick on the ceiling portion having a different shape than the wick on the internal side portions of the heat pipe.

Although Hara et al. are deficient in providing the wick on the ceiling portion having a different shape than the wick on the internal side portions of the heat pipe, at the time the invention was made, it would have been an obvious matter of design choice to a person having ordinary skill in the art to provide a wick on the ceiling portion having a different shape than the wick on the internal side portions of the heat pipe, because the Applicant has not disclosed that providing a wick on the ceiling portion having a different shape than the wick on the internal side portions of the heat pipe provides a particular advantage, is used for a particular purpose, or solves a stated problem. One having ordinary skill in the art, furthermore, would have expected

Hara et al.'s system, and Applicant's invention to perform equally well with either the wicks as taught by Hara et al. and the claimed wick on the ceiling portion having a different shape than the wick on the internal side portions of the heat pipe because both wick configurations would perform the same function of transporting fluid via capillary action.

Regarding claim 15, Hisai et al. as modified by Hara et al. teach all the limitations of the claimed invention, but fail to teach the limitation of the wick plate on the ceiling portion having a plurality of planar wicks.

Although Hara et al. are deficient in providing the wick plate on the ceiling portion having a plurality of planar wicks, at the time the invention was made, it would have been an obvious matter of design choice to a person having ordinary skill in the art to provide a wick plate on the ceiling portion having a plurality of planar wicks, because the Applicant has not disclosed that providing a wick plate on the ceiling portion having a plurality of planar wicks provides a particular advantage, is used for a particular purpose, or solves a stated problem. One having ordinary skill in the art, furthermore, would have expected Hara et al.'s system, and Applicant's invention to perform equally well with either the ceiling wick as taught by Hara et al. and the claimed wick plate on the ceiling portion having a plurality of planar wicks because both wick configurations would perform the same function of transporting fluid via capillary action.

Regarding claim 16, Hara et al. teach the limitation of the wick on the ceiling portion and the wick on the internal side portions of the heat pipe has a linear shape [as illustrated in figure 4, wick 38 is linear in shape], a spiral shape or a radial shape.

Regarding claim 18, Hara et al. disclose the limitation of the heat pipe having a wick plate installed on the ceiling portion, and a wick plate installed on the internal side portions of the heat pipe (illustrated in figure 4 that the interior of the wafer chuck 31 corresponds to the wafer chuck 91 and has interior sides)

Regarding claim 21, Hisai et al. disclose the limitation of the coolant being water (see paragraph 93, lines 20-26).

Regarding claim 22, Hisai et al. teaches that the thermostatic element extends along the bottom surface of the heat pipe inside the heat pipe [illustrated in figure 3, pipe 21 is disposed along the bottom of the heat pipe], the bottom surface facing away from the heater [see the rejection of claim 1] and the thermostatic element being substantially submerged in coolant when coolant is supplied to the heat pipe [see paragraph 56, the steam being generated will submerge the thermostatic element].

Regarding claim 23, Hisai et al. as modified by Hara et al. and Emoto teach all the limitations of the claimed invention, but fail to explicitly teach that the heater extends along the entire top surface of the heat pipe.

The general concept of extending the heater to extend along the entire surface of the pipe falls within the realm of common knowledge as obvious mechanical expedient, and one having ordinary skill in the art would have been motivated to include the use of extending the heater to

extend along the entire surface of the pipe in order to increase heat transfer between the heater and the heat pipe, thus increasing system efficiency.

4. Claims 2, 10, 11 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hisai et al. as modified by Hara et al. as applied to claim 1 above, and further in view of Leffert (US 3,621,906).

Regarding claims 2, 10, 11 and 25, Hisai et al. as modified by Hara et al. teach all the limitations of the claimed invention, but fail to teach the limitations of providing a coolant flowing element for flowing the coolant into the heat pipe when the plate is cooled, wherein the coolant flowing element is a heater disposed inside and adjacent to the coolant storage tank for flowing the coolant into the heat pipe when the plate is cooled, and wherein the coolant flowing element is adapted to control fluid flow by varying pressure.

Leffert teaches the concept of providing a resistance heater with a control reservoir for increasing the vapor pressure in the heat pipe [see column 11, line 72 – column 12, line 9].

In regard to claims 2, 10 and 25, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of Hisai et al. as modified by Hara et al. to include the heater being disposed adjacent to the coolant storage tank as taught by Leffert in order to closely maintain the rate of heat transport from a heat source to the evaporator portion of the heat pipe at a level where the temperature under steady state conditions, thus maintaining a temperature less than that of the heat source.

In regard to claim 11, Although Leffert is deficient in providing the heater inside the coolant storage tank, at the time the invention was made, it would have been an obvious matter of design choice to a person having ordinary skill in the art to provide the heater inside the coolant storage tank, because the Applicant has not disclosed that providing the heater inside the coolant storage tank provides a particular advantage, is used for a particular purpose, or solves a stated problem. One having ordinary skill in the art, furthermore, would have expected Leffert's system, and Applicant's invention to perform equally well with either the heater disposed on the exterior the coolant storage tank as taught by Leffert or the claimed heater inside the coolant storage tank because both heater/coolant storage tank combinations would perform the same function of providing heating of the coolant storage tank.

Therefore, it would have been a prima facie case of obviousness to modify Leffert to obtain the invention as specified in claim 11 because such a modification would have been considered a mere design choice which fails to patentably distinguish over the prior art of Leffert.

5. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hisai et al. as modified by Hara et al. and Emoto as applied to claim3 above, and further in view of Komino (JP5315293).

Regarding claim 27, Hisai et al. as modified by Hara et al. and Emoto teach all the limitations of the claimed invention, but fail to teach that at least a portion of the coolant is liquid coolant and the cooling water supply line is substantially submerged in the liquid coolant portion when the coolant is supplied to the heatpipe.

Komino teaches the concept of providing a cooling system for a wafer (referring to figure 3), wherein a wafer (W) is disposed on a platform (20) that is in thermal communication with a heatpipe (40) that is submerged in a tank (46) filled with a coolant (44), wherein a coolant supply line (64) is submerged in the coolant (illustrated in figure 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the baking system of Hisai et al. as modified by Hara et al. and Emoto to dispose a coolant supply line in a tank full of coolant that is heat exchanged with a heatpipe as taught by Komino in order to provide increase in heat transfer between the heat pipe and the coolant to exhaust heat from the wafer, thus increasing cooling efficiency.

Response to Arguments

6. Applicant's arguments filed 4/23/2009 have been fully considered but they are not persuasive. The Applicant contends that the cited references fail to teach or suggest a coolant storage tank adapted to store the coolant supplied to the heat pipe via a coolant supply line when the plate is heated and vice versa when cooled (see page 7 paragraph 3, page 8 paragraphs 1-4 and page 9 paragraph 4) pertaining to the rejections of claims 1 and 26. The examiner respectfully disagrees. The limitation "adapted to supply coolant into the heatpipe when the plate is cooled and to store the coolant supplied to the heatpipe when the plate is heated" as recited in claim 1 and the limitations "configured to provide flow communication between the coolant storage tank and the heatpipe," "configured to receive the coolant from the heat pipe via the coolant supply line" and "configured to receive the coolant from the coolant storage tank via the coolant supply line" as recited in claim 26 are statements of intended use, and indicates that

the claimed apparatus has to be designed to perform the function intended to be performed, not the action of positively performing the function, as is the case here. In Hara et al., coolant supply line 96 being disposed between coolant tank 97 and heatpipe 91 as illustrated in figure 9 illustrates that there is sufficient structure to perform the aforementioned intended use limitations. In conclusion, for at least these reasons, the Examiner respectfully submits that the rejections of the pending claims are properly upheld.

7. Applicant's arguments with respect to claim 27 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AZIM RAHIM whose telephone number is (571) 270-1998. The examiner can normally be reached on Monday - Thursday 7am - 3pm EST and Friday 7am - 9:30am EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frantz Jules can be reached on 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. R./
Examiner, Art Unit 3744
7/19/2009
/Frantz F. Jules/

Supervisory Patent Examiner, Art Unit 3744